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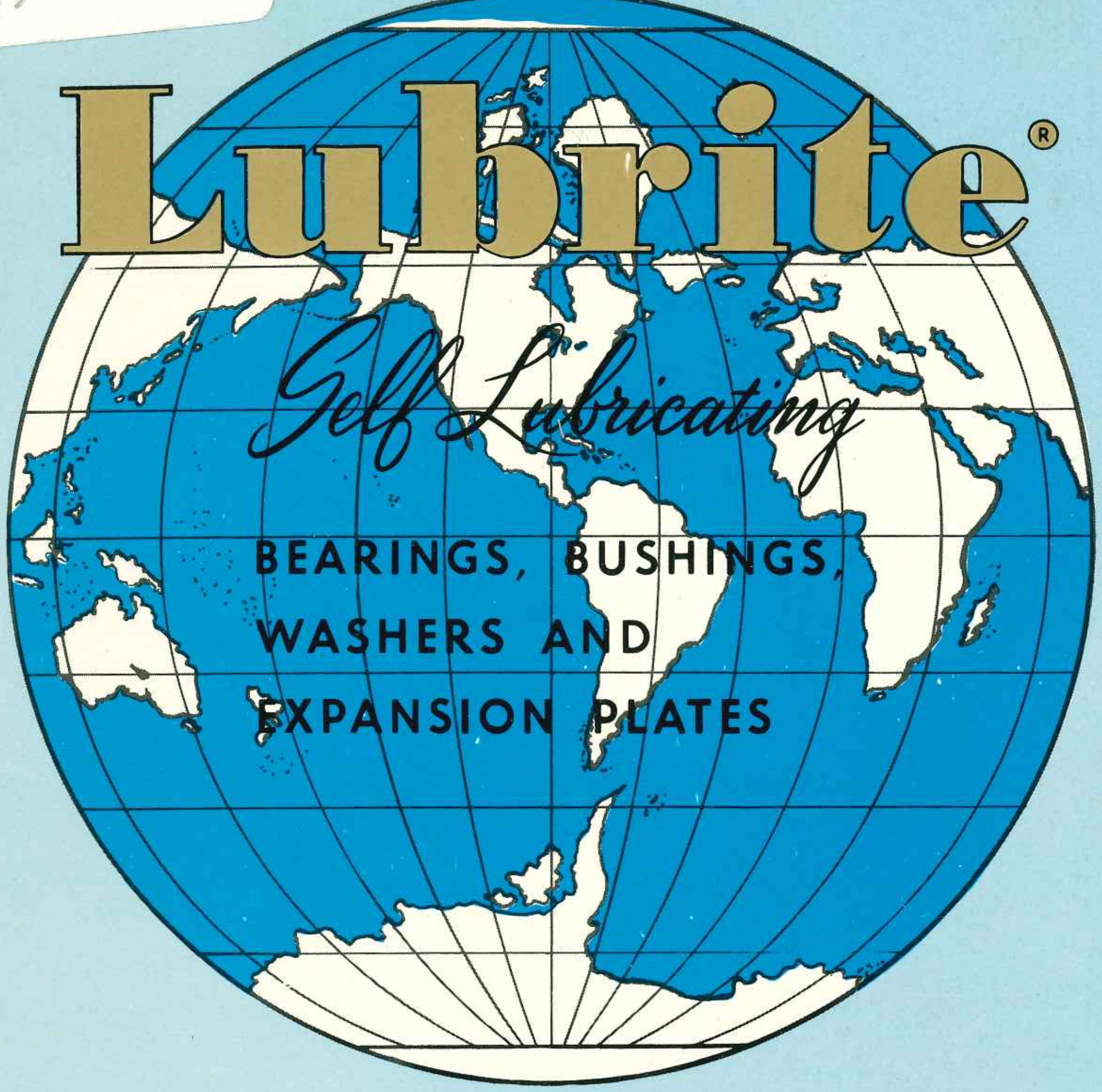
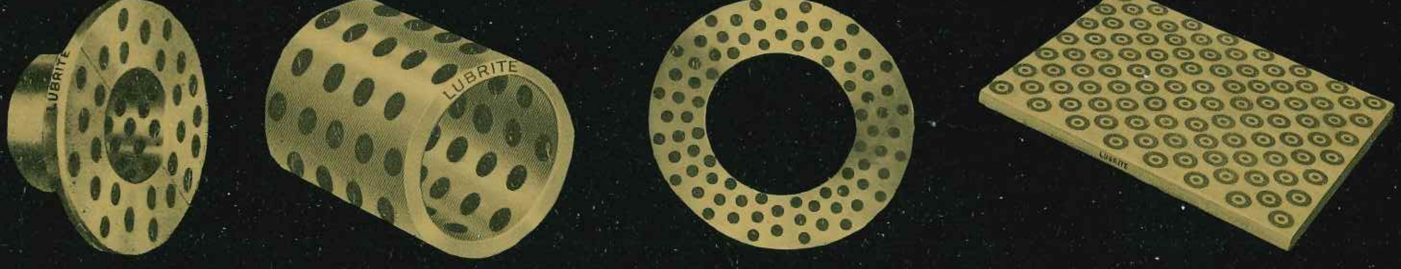


Lubrite®

Self Lubricating

BEARINGS, BUSHINGS, WASHERS AND EXPANSION PLATES



LUBRITE DIVISION
MERRIMAN BROS., INC.
Subsidiary of UTD CORPORATION
Boston, Massachusetts 02130

LUBRITE . . . . .

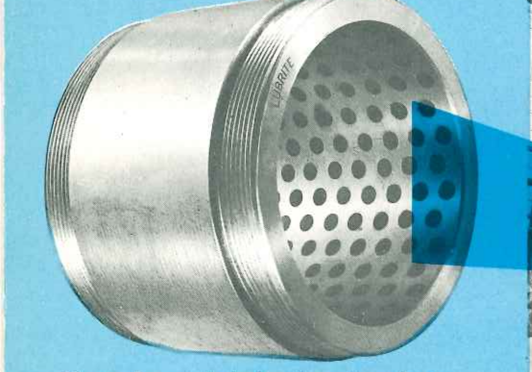
is the name that has become synonymous with quality and dependability in the field of solid film lubrication with a proven record of successes. It is specified for projects and equipment where superior performance is a necessity

LUBRITE bearings are completely self-lubricating for their entire service life — no additional or supplementary lubrication is required. The self-lubricating features of Lubrite eliminate the human elements "coefficient of negligence" in maintenance and the costs of bearing upkeep.

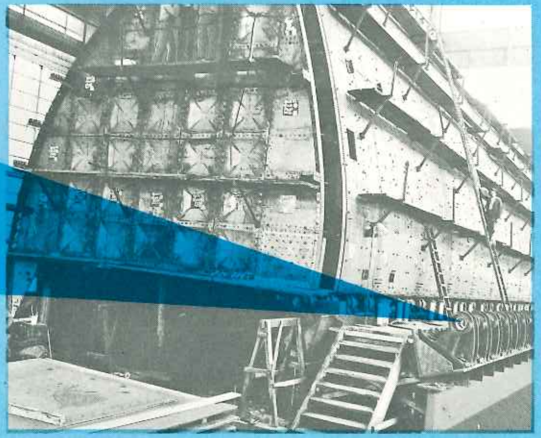
LUBRITE is designed primarily for medium and heavy loads at slow and medium speeds. Solid film Lubrite lubricants support loads which can not be sustained by other lubricants. Lubrite lubricants do not cold flow or creep under prolonged periods of loading. Lubrite offers an advantageous safeguard against damaging frictional and wear effects such as galling, scuffing, fretting, Brinelling, cold-pressure fusion and absolute seizure.

LUBRITE is unexcelled in "trouble" areas that are difficult or impossible to maintain or where ordinary lubricants are wiped, scraped or extruded. Lubrite offers a cleaner bearing where lubricant contamination is a danger, where appearance is important and for high temperature applications where other lubricants may carbonize and create a fire hazard.

Though not a "cure-all," Lubrite bearings are solving difficult, as well as common, bearing problems. You, as a designer or manufacturer, are aware of the growing costs of repairs, maintenance and replacement of today's highly complicated machinery and equipment. Therefore, the advantages of a bearing with complete self-lubrication, reliability, efficient performance and overall low costs are features you can not afford to overlook.



The above Lubrite bearing is typical of the 440 employed in the drum gates of Grand Coulee Dam.



Drum Gate

Dam

LUBRITE

- provides complete self-lubrication
- is maintenance-free
- lubrication does not squeeze out or break down
- bearings carry extreme dynamic and static loads
- has low coefficient of friction
- operates under water or in liquids
- prevents galling, scoring and seizing
- operates at temperature extremes
- stays clean and will not contaminate
- is non-corrosive, non-conductive and non-electrolytic
- bearings require no supplementary lubrication

Lubrite is the registered trade name for all products manufactured by the Lubrite Division of Merriman Bros., Inc.
. . . ONLY MERRIMAN MAKES LUBRITE

INTRODUCTION

Over sixtyyears of research, progress and manufacturing experience have made Lubrite foremost in the field of dry, solid self-lubrication. These factors have resulted in an outstanding record of new developments, continued improvement, constant growth and increased usage in all phases of construction and industry.

Our major interest is in continuing to provide the finest bearings in the dry self-lubrication field. To help accomplish this aim, we have complete manufacturing facilities that include pattern shops, a modern, versatile foundry and well equipped machine shops, each with specialized and unique machinery specifically designed for our processes. These complete facilities, combined with rigid control and inspection procedures, assure quality and economy.

LUBRITE lubricants are formulated and processed under the supervision of research chemists and metallurgists to provide you with the most suitable Lubrite lubricant for your application.

We have the experience, technological talent and the specialized equipment needed to make self-lubricating bearings of the highest caliber — from the basic melting of the bearing alloys to the finished product — all done in our completely integrated plant.

Complete engineering, manufacturing, testing and control facilities assure you of an engineered bearing to meet your specific requirements.

LUBRITE bearings have achieved many notable "firsts" which are now accepted standards in the field.

You, as a designer, engineer or manufacturer, are offered this cumulative experience and manufacturing skill to help solve some of the difficult lubrication problems that occur in bearing design and usage.

LUBRITE meets the exacting requirements of the U. S. Bureau of Reclamation, U. S. Army, Corps of Engineers, Tennessee Valley Authority, St. Lawrence Seaway Authority, U. S. Navy, National Aeronautic and Space Administration, other Federal and State Agencies as well as many of the world's leading designers and manufacturers.

The most convincing evidence of successful and dependable performance of Lubrite is the record of REPEAT ORDERS and INCREASED USAGE throughout the world.

This publication is for informational purposes only. Due to countless variables that may be introduced and which will affect the results obtained, Lubrite cannot assume responsibility for application of this data.

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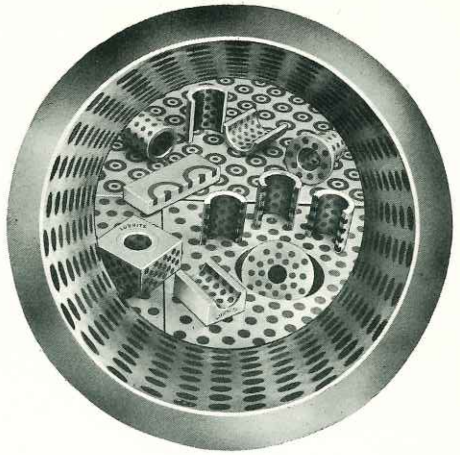
WHAT IS LUBRITE?

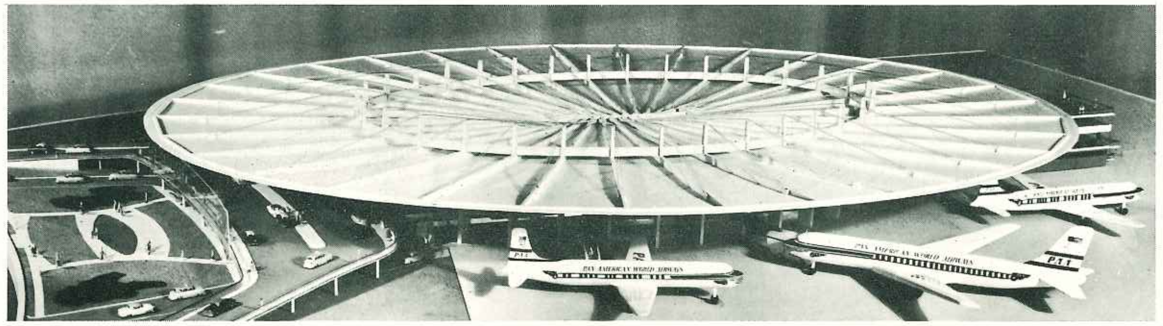


LUBRITE is the *different* self-lubricating bearing that is the result of over sixty years of quality manufacturing and intensive research, plus engineering and metallurgy in lubricants, bearing metals and production processes. A different demand, or set of demands, is made of bearings in every different product. Lubrite bearings are specifically designed to offer the best for *your* conditions of operation.

LUBRITE products are made up of two basic components, the supporting bearing metal and the exclusive Lubrite lubricants. Bearing metals can be readily duplicated. However, it is the special Lubrite lubricants, coupled with highly specialized manufacturing and processing techniques, which make Lubrite superior in performance over other bearings. This superiority is readily apparent in the extended wear life, low coefficient of friction and long service you receive from Lubrite.

LUBRITE bearings are normally manufactured from bronze alloys produced in our foundry where control, quality and adherence to specification are of utmost importance. Lubrite bearings are not, however, limited to bronze alloys. Where the application imposes special conditions, Lubrite bearings can be and are made from any practical bearing metal.

LUBRITE bearings are precision machined to specified size prior to Lubriting. The size, spacing and arrangement of the lubricant recesses are carefully engineered to give the correct percentage of lubrication and the lubricating pattern is designed to provide optimum lubrication coverage. The lubricated area is a minimum of 25% on expansion plates and 30% on bushings.



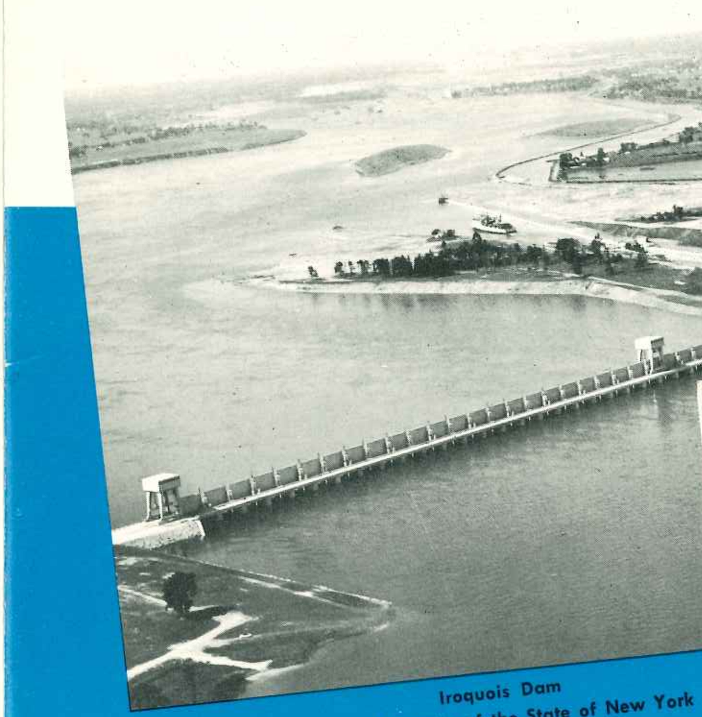
Pan American World Airways' Passenger Terminal at New York International Airport

LUBRITE lubricants are *not* just plugs or pellets of graphite that are inserted into holes in the product as the final step in manufacturing. Lubrite lubricants are compounded, solid-film, dry lubricants consisting of metals, metallic oxides, minerals, graphite and other lubricating materials combined with a lubricating binder. These ingredients are thermally molded with the bearing metal under hydraulic pressure to provide durable "built-in" self-lubrication. All of the ingredients in the lubricant have inherent and distinct lubricative qualities. The lubricant formulae are adjusted to suit application requirements. They may contain all or part of the materials mentioned above as best suited for your application. The compounding of Lubrite lubricants is closely controlled in manufacture by our staff chemists. Lubrite products are tested under actual full scale operating conditions by our engineers.

Lubrite bearings are Lubrited by means of hardened steel, close fitting dies in specially designed equipment. The Lubrite lubricant is extruded and compressed into the recesses at pressures of 18,000 to 20,000 p.s.i. This molding pressure greatly exceeds the usual allowable loading of the bearing itself. This process produces a dense, solid reservoir of lubricant molded with the bearing to form a single integral unit.

LUBRITE lubricants are compounded to give successful operating results for a wide variety of adverse conditions such as operation under water, in superheated steam, in solvent solutions, in corrosive atmospheres, at sub-zero temperatures, in conjunction with oil or grease, exposed to gamma radiation and at temperatures up to 1500°F.

Extreme-condition applications should be referred to us for recommendations. We offer complete engineering assistance at no obligation.



Iroquois Dam
Power Authority of the State of New York

Nuclear Power Plant
Commonwealth Edison Company
Dresden Station

LUBRITE products are highly resistant to corrosion. The basic bearing metal is usually of bronze or some other non-corrosive material. The Lubrite lubricant is also corrosion resistant and protects the surfaces in contact with it.

A report on the chemical analysis of Lubrite lubricants performed by an independent research laboratory states that:

> *"The Lubrite lubricants consist of chemically stable elements, compounds and naturally occurring substances. All ingredients employed are of prime quality and are resistant to and protective against moisture, oxidation and other corrosive media. There is nothing present of a hygroscopic nature or of sufficient solubility to promote the development of an electrolytic cell between dissimilar metals".*

LUBRITE lubricants were developed and are manufactured solely by Merriman Bros., Inc.

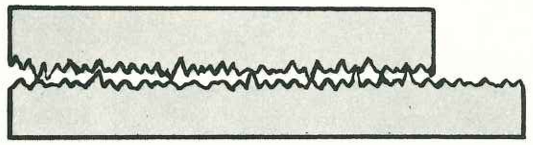
HOW LUBRITE FUNCTIONS

Friction is defined as the resistance to relative motion between materials in contact, and is directly proportional to the shear strength of the softer material. The major causes of this resistance to movement are the interlocking action of the surface asperities and the high shear strength of mating materials.

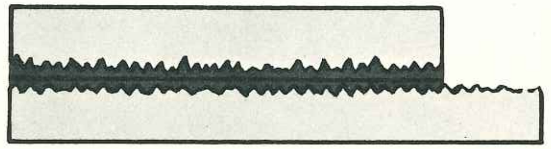
Metals, regardless of degree of surface finish, contain surface irregularities or asperities that can be measured in micro-inches. Under microscopic examination, these irregularities appear as peaks and valleys. In order to reduce friction, it is necessary to level off or cover these asperities with a lubricating film of low shear strength.

In an unlubricated system of dissimilar materials, the softer material must necessarily wear or abrade if motion is to take place. This abrasion is observed as a high friction coefficient. Phenomena, such as galling, fretting and cold pressure welding may occur and result in absolute seizure.

The purpose of a lubricant is to eliminate or minimize the actual contact between opposing materials and, at the same time, introduce a low shear strength lubricating material into the system. Performance of the lubricant is dependent upon maintaining a complete lubricating film between the mating surfaces. Most lubricants fail to maintain an *effective* lubricating film when subjected to heavy loads and low surface velocities. Fluorocarbon resins, fibers and film cold flow and creep under these conditions. Lubrite lubricants were developed to fill the need for a dependable lubricant at medium to extreme pressures and moderate to slow speeds operating in various media and wide ranges of temperature.



Micrographic sketch of unlubricated machined surfaces showing interlocking action of asperities.



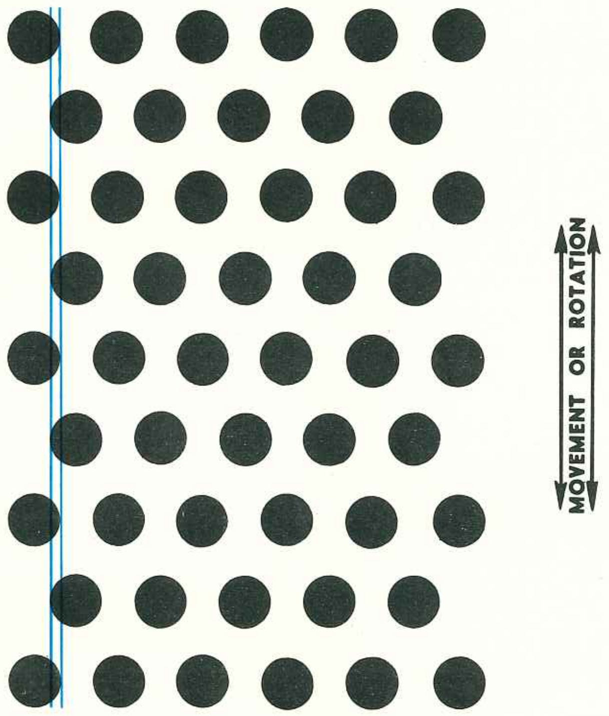
Micrographic sketch showing Lubrite lubricant keyed to surfaces, covering asperities and providing low shear strength lubricating film between opposing surfaces.

Lubrite lubricants do not "flow" like oil or grease or creep like fluorocarbons. They are thick-film, solid, dry lubricants which derive their special properties from their inherent and unique laminar-lattice crystalline structure. This type of structure lends the desired low shear strength and makes possible the regenerative lubricating film, associated with Lubrite lubricants, by translation of movement along crystallographic planes. The interatomic forces are much greater than the external interplanal forces so that shear takes place between lubricant planes. The shear effect of the lubricant can be compared to the progressive shifting action of a deck of cards subjected to an eccentric force, each card representing a crystalline plane of lubricant. However, the molecular forces in each plane resist the destruction of the plane by pressure or heat. As a result of these phenomena, the basic members of the system are protected from wear and frictional effects.

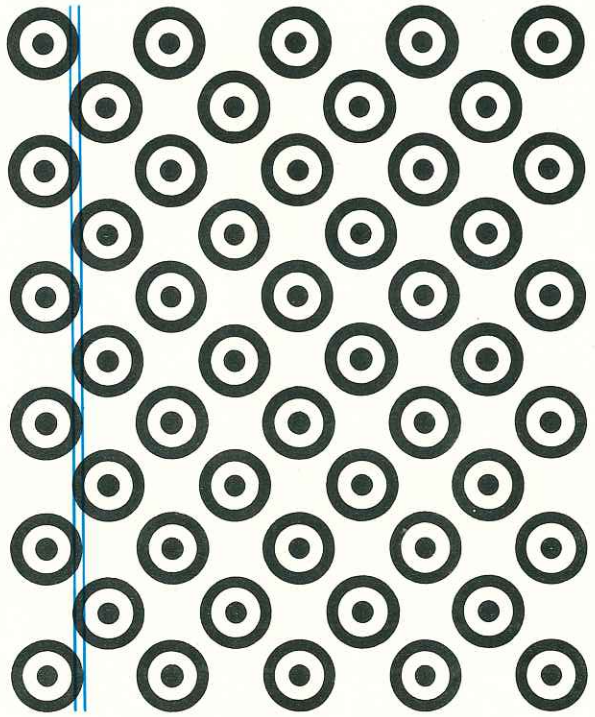
In actual practice, the compressed Lubrite lubricants project slightly above the bearing surfaces and progressively overlap in the direction of motion. With motion between mating surfaces, this overlapping pattern, coupled with the lubricity of Lubrite lubricants, forms a continuous, heavy duty, friction reducing film on intermediate areas of the bearing and on the mating surface. Due to surface roughness, the *actual* area of contact between two unlubricated or partially lubricated surfaces is several thousand times smaller than the apparent contact area. The Lubrite lubricant bonds to the microscopic surface asperities of each surface and quickly burnishes, resulting in a highly polished and lubricative bearing surface capable of withstanding extreme pressures. This film of lubrication reduces asperity contact, increases the actual load carrying area and decreases friction.

Lubrite lubricants are nearly indestructible and carry exceptionally heavy loads without breaking down. Static loads can be maintained indefinitely with Lubrite without destroying the lubrication.

The Lubrite Bushing or Plate is completely self-lubricating and is unlike many of the so-called "oilless" bearings which still require oil at varying intervals of time, presenting a maintenance problem. Lubrite eliminates the need for expensive oiling accesses and also eliminates the danger of pickup of dirt and foreign matter.



Developed layout of typical lubrication pattern with standard Lubriting.



Developed layout of typical lubrication pattern with Trepanned* Lubriting.

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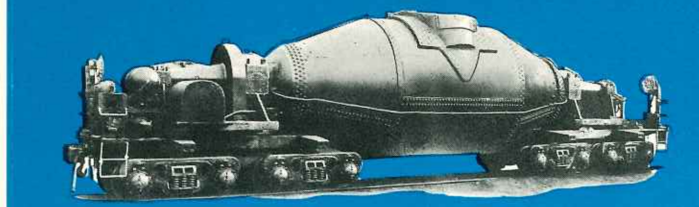
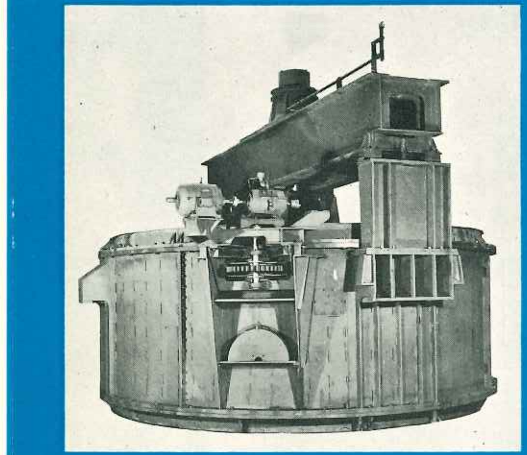
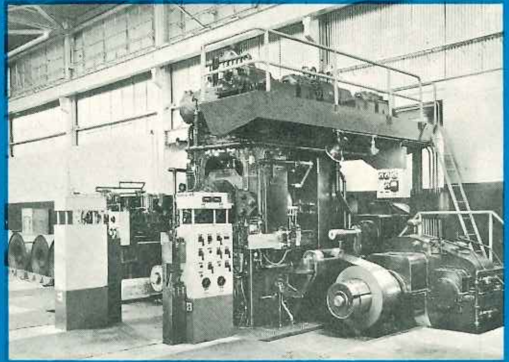
*Patent No. 2,187,626

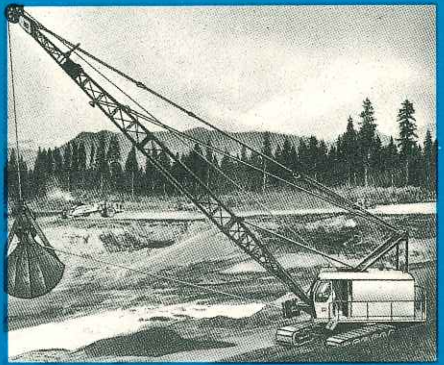
LUBRITE
CHOICE OF LEADING ENGINEERS and DESIGNERS


Hot Metal Car

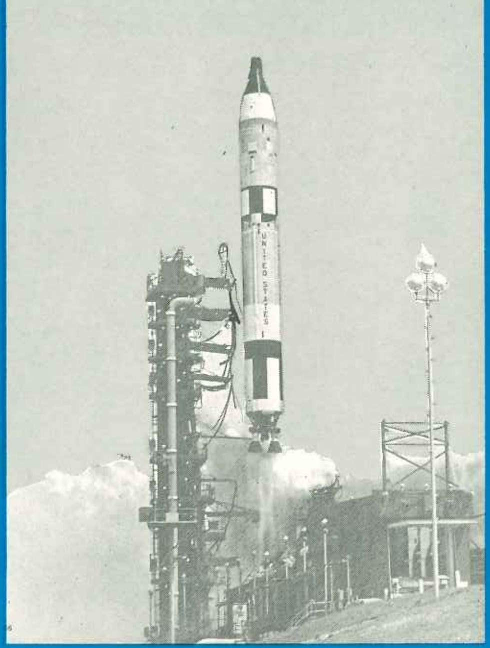
Official U.S. Navy Photo of Atomic Submarine

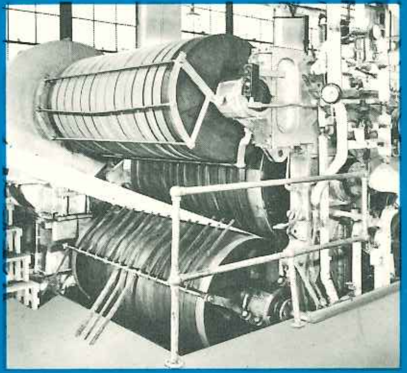

Air Preheater


Rolling Mill


Crane

Hydraulic Press

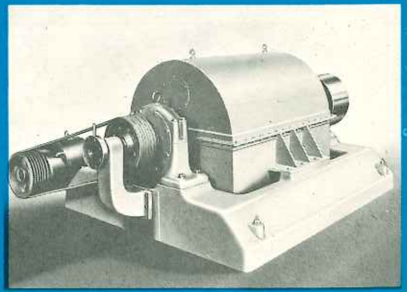

Missile And Space Programs


Rubber Rotocure Press

Dam

Industrial Bucket

Baking Oven


Centrifugal Filter

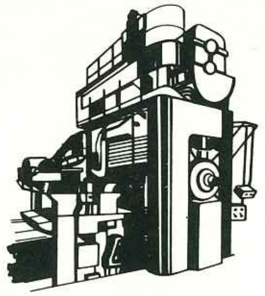
TYPES OF APPLICATION

A few types of applications and uses are listed below. These represent only a partial listing of the many fields in which Lubrite has solved difficult and unusual bearing problems. Your specific application may not be listed here, but Lubrite may still be your answer. We solicit your inquiries. Our Engineering Department is available, without obligation, to assist you in solving bearing design problems.

DAM GATES AND ACCESSORIES

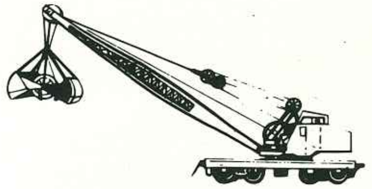
Tainter Gate Trunnions
Dogging Devices
Roller Gate Bearings
Cranes (gate lifting)
Turbine Gate Pin Bearings
Floating mooring bits
Valve operating machinery
Roller Chains
Fixed Wheel Gates
Sheaves
Flap Gates
Slide Gates
Mitre Gates
Sector Gates
Vertical lift crest gates

STEEL MILL APPLICATIONS



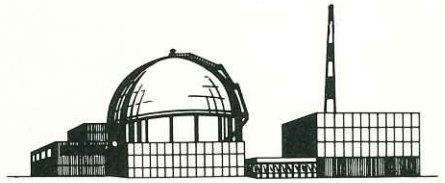
Cupola Chargers
Rolling Mills
Soaking Pit Covers and Cranes
Slabbing Mills
Kiln Cars
Normalizing Equipment
Open Hearth Furnaces
Cinder Pot Cars
Coil Tilters

EARTH MOVING EQUIPMENT



Power Shovels and Excavators
Tractors, Trailers and Crawlers
Cranes
Bulldozers and Scoops

SPECIAL APPLICATIONS

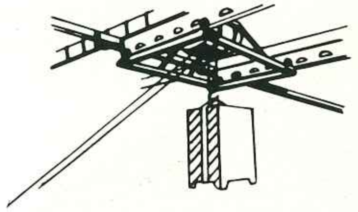


Atomic Energy Reactors
Radar Antennae
Grain Chute Bearings and Spouts
Agitators and Digesters
Tackle Blocks
Aircraft Carrier Jet Blast Equipment
Minesweeper Towing Gear
Aircraft Carrier Arresting Gear

SPECIAL MACHINERY AND EQUIPMENT

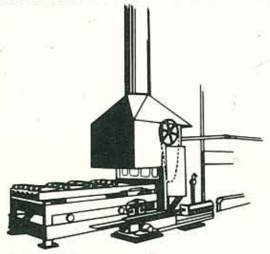
Movable Bridge and Bridge Operating Mechanisms
Turntables and Railway Equipment
Oil Refinery Equipment
Rubber and Tube Machinery
Dust Collecting Equipment
Road Building Machinery
Agricultural Equipment
Butterfly Valves

MATERIAL HANDLING EQUIPMENT



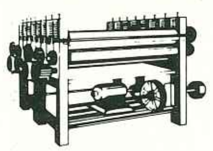
Conveyors
Cargo Handling Equipment
Dock and Dredge Equipment
Hoisting Equipment and Cranes
Derrick and Tackle Block Sheaves
Cable Ways, Drag Lines and Logging Equipment
Tractors, Trailers and Crawlers
Coal and Ore Handling Machinery
Cable Ways and Hanger Conveyors

HIGH TEMPERATURE APPLICATIONS



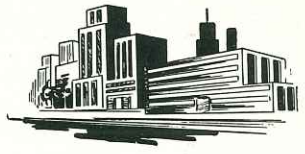
Vulcanizing Cars and Ovens
Core Ovens and Cupola Chargers
Annealing, Enameling and Bakers Ovens
Furnace Dragouts
Kiln Cars and Soaking Pit Covers
Supersonic Wind Tunnels
Vulcanizing Cars and Rotary Vulcanizers
Roasters
Valves
Drying Ovens
Foam Rubber Manufacturing Equipment
Atomic Energy Reactors

INDUSTRIAL APPLICATIONS



Idler Gears
Loose Pulleys
Mixers, Grinders and Pulverizers
Foundry Equipment
Clutches
Coke Plant Equipment
Stokers
Textile and Paper Mill Machinery
Canning Machinery
Food and Candy Processing Machinery
Rubber Mill Equipment
Elevators and Escalators
Printing and Washing Machinery
Concrete Plant Equipment
Glassmaking Equipment
Degreasing Equipment
Garnett Machinery
Journal Bearings

STRUCTURAL APPLICATIONS



Highway Bridges
Industrial Buildings
Shopping Centers
Auditoriums
Gymnasiums
Churches
Overpasses
Expansion Bearings
Vessel Supports
Oil and Chemical Refinery Equipment
Hangar Bearings
Railroad Bridges
Heat Exchangers
Penstocks
Pipelines
Airport Hangars

For complete data on Lubrite expansion plates, Radialube plates and bearings for structural application refer to our Manual No. 55-3

LUBRITE PRODUCTS

Lubrite bearings can be supplied in practically any shape or configuration. Lubrite is regularly produced as sleeve bushings (one piece, two piece or split), flanged bushings, washers, liners, expansion plates and as Radialube plates.

ONE PIECE BUSHINGS

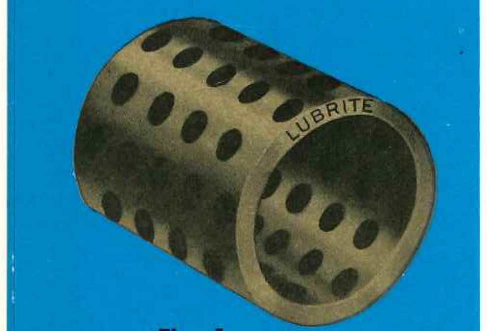


Fig. 1

Normally, the one piece or sleeve bushing is used as a general purpose bearing. This style of bushing is usually provided with Standard Lubriting which extends through the bushing wall (see Fig. 1 and Pattern A below). One piece bushings should be press fitted into a housing to prevent rotation and to provide backing for the lubricant. With one piece bushings, where it is advantageous to utilize the Lubriting on both the inside and outside diameters, the bushings "float" between shaft and housing providing lubrication on both surfaces.

The one piece bushing may be used for heavy duty as well as general duty by the proper selection of bearing alloys (see pages 14 and 15).

For extreme loadings, the one piece bushing, of the proper alloy, together with special internal Lubriting is recommended (see Fig. 2). This design offers greatest load carrying capacity since it has the combined advantages of both the one piece and the two piece bearing. The lubricating recesses extend only partially through the bearing wall, offering added strength in backing up the lubricant. This design is specified where loading is of the highest order and longevity is of the utmost importance, such as on hydro-electric gate bearings, bridges, wind tunnels, and other long-lived installations. One piece, internally Lubrited bearings can be made in any size with a minimum of 4″ inside diameter.

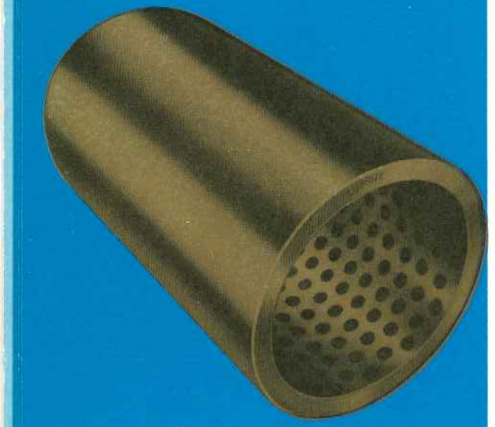
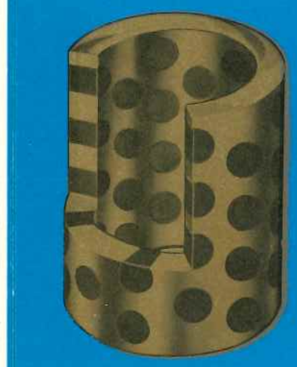
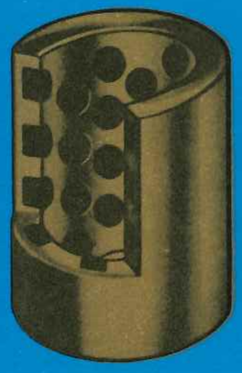


Fig. 2

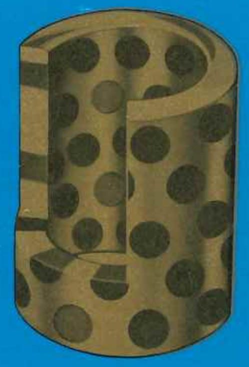
Shown below are various lubricating patterns for particular classes of duty and usage. Pattern A is normally furnished for most applications unless the operating conditions indicate the use of an alternate pattern of Lubriting.



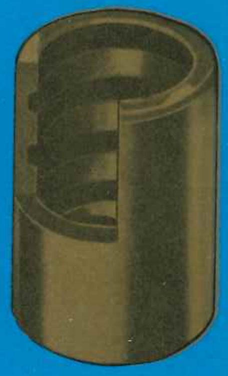
PATTERN A
Standard Lubriting for general and heavy duty rotary motion.



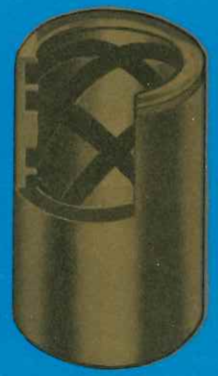
PATTERN B
Internal Lubriting for extreme heavy duty rotary motion.



PATTERN C
Lubriting for general and heavy duty reciprocating motion.

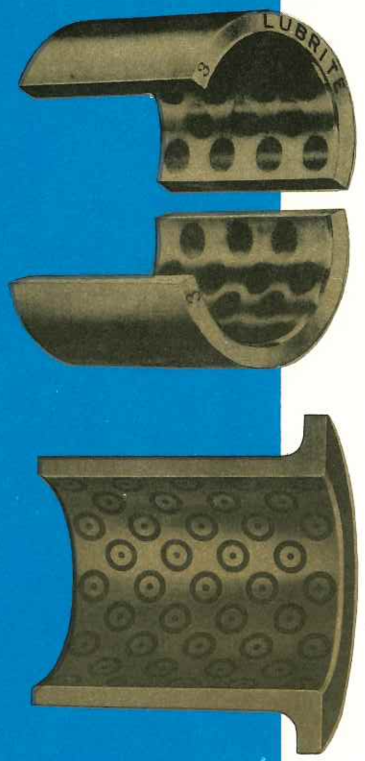


PATTERN D
Helical Lubriting for general duty, oscillating, and/or reciprocating motion.



PATTERN E
Lubriting for light or intermittent duty, rotary and/or reciprocating motion.

TWO PIECE BUSHINGS



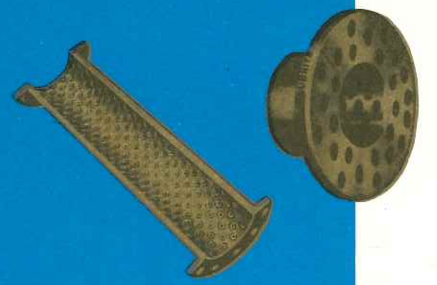
In applications where assembly, disassembly or other installation problems are encountered, two piece (or longitudinally split) bushings are sometimes necessary. Two piece bushings are normally furnished with the standard Lubriting pattern but the lubrication does not extend through the bearing wall. Two piece bushings can also be supplied with the advantageous trepanned pattern of lubrication on sizes over 4″ inside diameter.

Two piece bushings are machined as single units and match marked to guarantee complete concentricity and perfect bearing. Match marking is essential for the proper assembly and fitting of two piece bushings. In order to insure the concentricity and perfect bearing of two piece bushings, the surfaces of the mating halves should not be machined, filed or altered in any way.

Lubrite bearings are also offered as individual half bearings, commonly referred to as perfect half bearings. However, individual or perfect half bearings are not as economical and should be specified only where the bearing centerline is extremely critical. Our experience has shown that two piece bearings are adaptable to most designs, and offer substantial savings in cost over perfect half bearings.

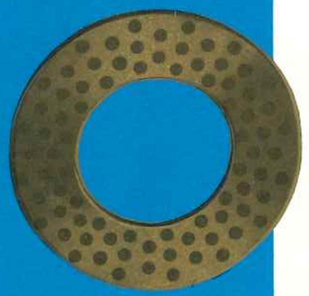
In applications where the bushing rotates, rather than the shaft, the one piece bushing is recommended over the two piece for best performance.

FLANGED BUSHINGS



Both one and two piece Lubrite bushings can be furnished with a flange at one or both ends. Either one or both faces of the flanges may be Lubrited to provide a self-lubricating surface for end thrust, or may be used without lubrication as a spacer, or as a holding flange. Flange thickness is usually the same as the wall thickness, but can be supplied in practically any diameter or thickness.

THRUST & EXPANSION WASHERS



Lubrite Thrust Washers are used to take rotational end thrust on a shaft, act as a spacer, or, in combination with a sleeve bearing, as a substitute for a flanged bearing. Lubrite Thrust Washers may be Lubrited on one or both faces. In the latter case, with lubrication on both faces, they "float" between two machined surfaces supplying friction reducing lubrication.

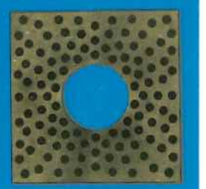
Lubrite Expansion Washers are used where motion takes place radially across the axis of the washer, and should not be used as rotational thrust members. Expansion washers have a series of progressive, concentrically machined and Lubrited rings on the bearing surface to provide lubrication for the type of motion expected.

Lubrite Washers can be furnished in many shapes and alloys for various purposes.

LINERS

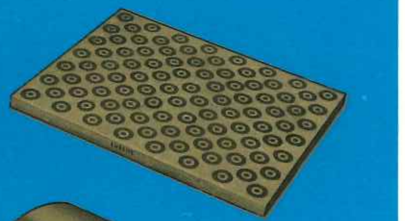
Lubrite liners and slide strips are normally used in machinery and equipment where sliding motion takes place longitudinally rather than laterally. For this reason, the length-width ratio is much greater than for bearing or expansion plates. Lubrite liners should not be used as expansion plates because the high length-width ratio prevents proper lubrication patterns. Where the width of the liner exceeds 3″, the trepanned style lubricating process (see below under Expansion Plates and on Page 5) should be used to obtain the most advantageous lubrication coverage.

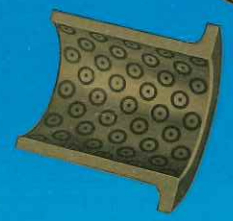
SPECIAL SHAPED BEARINGS



Special Lubrite bearings are made to conform to individual design requirements and can be made in any shape and size within the range of sound design to accomplish a wide range of functions that would be impossible with other type bearings. These may be in the form of segments of bushings or washers, cut-away bushings, spherically Lubrited surfaces, eccentric and oscillating blocks, self-aligning bearings, or other special shapes. Specific surfaces of specially designed bearings can be Lubrited to give the same satisfactory results as in regular Lubrite bearings. Parts may be Lubrited to provide for rotating, oscillating, sliding and eccentric motions.

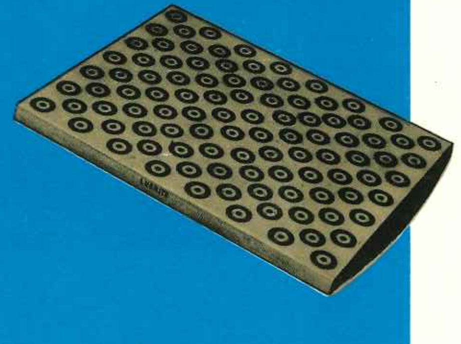
EXPANSION PLATES AND BUSHINGS FOR BRIDGES, STRUCTURES AND PROCESS EQUIPMENT

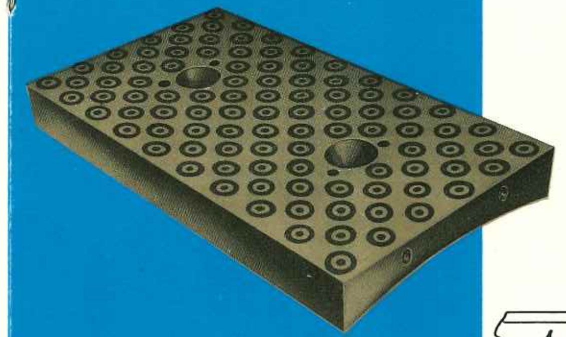




Lubrite bearings for structural, chemical and refinery equipment and allied applications offer simplicity of design, high efficiency and overall economy where long-lived performance is required. Since movements due to thermal forces are relatively small at expansion assemblies and rocker and hanger bearings, it is important that the lubrication pattern and coverage be the best obtainable. Therefore, Lubrite bearings for these applications are provided with the trepanned style of lubricating pattern. The trepanned pattern also provides lubrication coverage for transverse movements as well as for longitudinal movements of the structural members. Years of investigation and field tests in actual installations have proven the superiority of the trepanned lubricating pattern for bearings in structural applications. Since the design approach and solution to problems in the structural field must be treated differently, the subject of Lubrite expansion plates and bushings for structural applications is enlarged upon in Lubrite Manual No. 55-2.

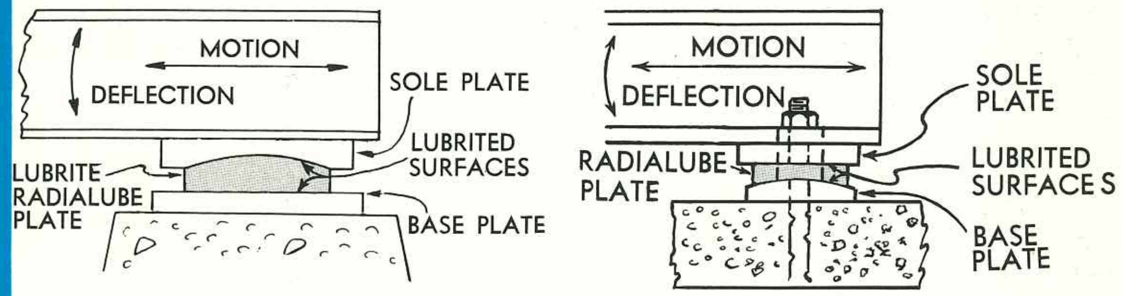
THE RADIALUBE® PLATE





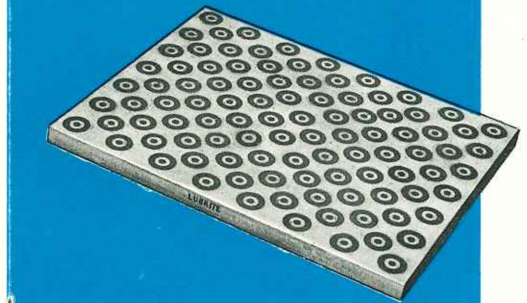
The Radialube® plate is similar to the regular Lubrite expansion plate except that *both* faces of the plate are Lubrited. One of the Lubrited faces is machined to a radial surface (either concave or convex) to mate with an opposing plate (usually steel) with an identical matching radius. The Radialube assembly is designed to provide for thermal expansion and contraction of the girder or beam on the flat Lubrited surface and, in addition, provides for the deflection or rotation of the beam or girder on the curved Lubrited surface. This design offers *uniform distribution of the loading over an area* both for expansion and contraction and for rotation due to deflection of the beam. The Radialube plate assembly and design suggestions are covered more completely in Lubrite Manual No. 55-2.

2 BASIC LUBRITE RADIALUBE® ASSEMBLIES* FROM MANY AVAILABLE



*Patent No. 2,680,259

CHROMALUBE® BEARINGS



Chromalube bearings have proven highly successful where temperatures have been in the order of 1500°F. and loadings up to 1500 p.s.i. and/or in the presence of corrosive atmospheres and solutions.

Chromalube is a substitution of high-strength-at-high-temperature Stainless Steel as the bearing metal coupled with a special Lubrite Lubricant.

This Chromalube Lubrite Lubricant is called "Type III" which has been compounded and tested for its lubricating qualities at high temperatures. Chromalube is not a "cure-all" for all extreme temperatures and/or load applications. It is, however, being used successfully in many installations that heretofore have presented serious expansion problems.

The primary design of a Lubrite bearing is governed by the following factors: unit loading, surface speed, ambient temperature and operating media. The detail design of a Lubrite bearing consists of determining bearing size, bearing alloy, operating clearances, mounting method and type of lubricant. The following pages cover the fundamental design factors for Lubrite bearings.

DETERMINATION OF NOMINAL DIMENSIONS

INSIDE DIAMETER

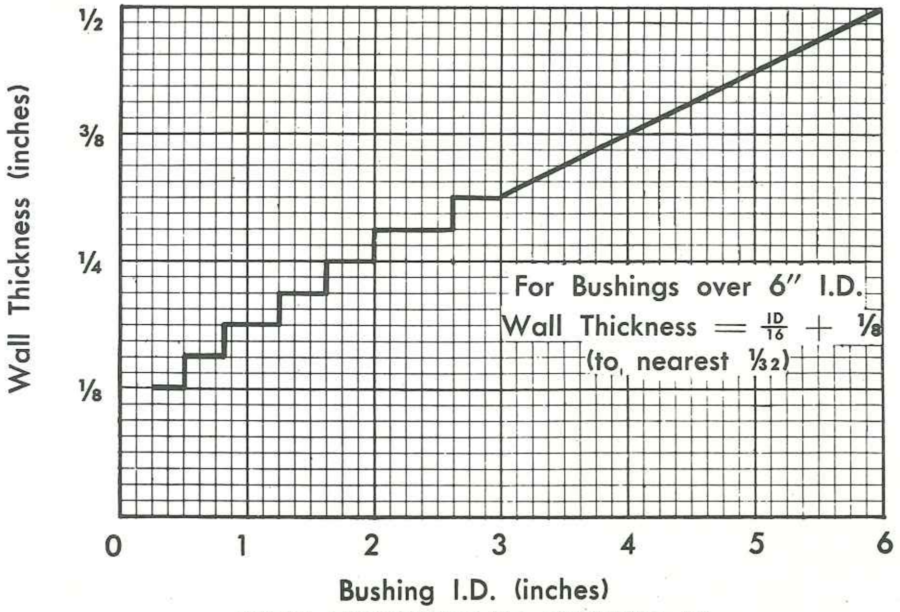
The nominal inside diameter of a bushing is, of course, dependent upon the shaft diameter. Bushings of least diameter, consistent with shaft strength and rigidity, offer the highest mechanical efficiency. Where bearing loads require an increase in bearing area, increase bearing length, rather than diameter, for minimum loss of power and frictional resistance.

LENGTH

Whenever possible, the length to diameter ratio of bushings should not be less than $\frac{L}{D} = 1.5$. Although this ratio is desirable, Lubrite bushings are in successful operation where the L/D ratio is considerably less due to space limitations. For best design, the length to diameter ratio should not exceed $\frac{L}{D} = 3.5$ because deflection of the shaft may cause edge concentration of loading. The above ratios are suggested as guides only. Where space limitations or operating conditions require deviation from the standard, Lubrite bushings can be furnished to meet these special requirements.

WALL THICKNESS

In general, the wall thickness of Lubrite bushings should be between 6 to 12% of the inside diameter (inversely proportional to the diameter). In diameters of two inches and under, relatively thicker walls are required in order to economically provide suitable lubricant recesses and sufficient Lubriting for long service. Minimum wall thicknesses for Lubrite bushings may be determined from the chart below.



WALL THICKNESS VS. BUSHING ID

The outside diameter of a bearing may be determined directly by use of the following empirical formula:
O.D. (to nearest 1/16") = 1.125 (I.D.) +.250.

The above suggested proportions provide ample strength for most applications. These proportions are suggestions only. Lubrite bushings can be furnished with practically any wall thickness.

FLANGE AND WASHER THICKNESS

On flanged bushings, the thickness of the flange is normally the same as the wall thickness of the bushing. Recommended thicknesses for washers range from ⅛" to ½" or more depending on diameter. A practical formula which may be used is:

$$\text{Washer Thickness} = \frac{OD + 4}{32}$$

LOADS & SPEEDS

Lubrite Bearings are designed primarily for medium and heavy loads at slow and medium speeds. They should usually be limited to surface velocities under 500 feet per minute. Maximum load carrying capacity is governed by the selection of proper bearing alloy. The design of bearings is influenced by such factors as the speed of operation, the unit loading, temperatures and other special conditions to which the bearing is subjected. The following load-speed factors are suggested and are within the limits of successful Lubrite operation.

CLASS OF SERVICE	TYPE OF DUTY	MAX. LOAD P (PSI)	MAX. SPEED V (SFM)	ALLOWABLE FACTOR PV	RECOMMENDED BEARING ALLOY NO.*
CONTINUOUS	CONSERVATIVE	1,000	500	15,000	237
	GENERAL	1,000 2,000	300 100	30,000	237 423, 424
	HEAVY	3,000	25	50,000	423, 424
INTERMITTENT	GENERAL	2,000	20 100	30,000 70,000	237 423, 424
	HEAVY	7,000	35	70,000	423, 424
SPECIAL	SLOW MOVING and STATIC	20,000	10	100,000	Consult Our Engineers

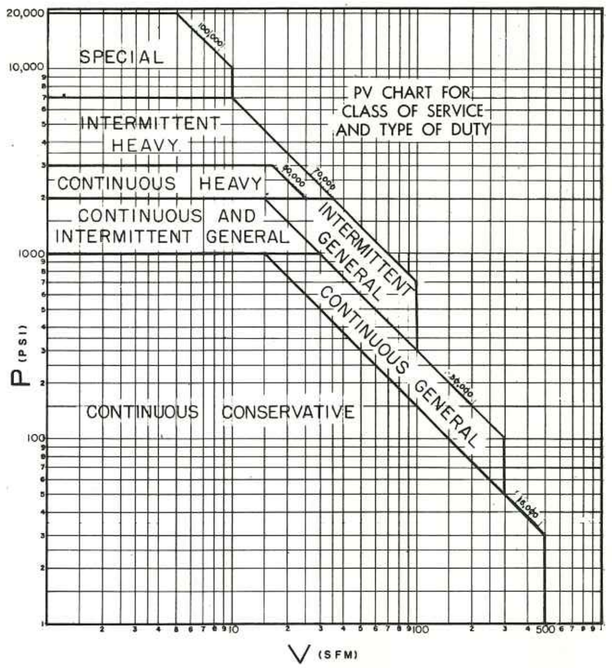
* FOR DETAILS ON BEARING ALLOYS SEE PGS. 14-15

The allowable factor, or PV, for any particular application may be calculated from the following formula:

$$PV = \frac{W}{LD} \times \frac{\pi DN}{12} = \frac{\pi WN}{12L} = \frac{0.262\ WN}{L}$$

Where:

P = bearing pressure, p.s.i. $= \frac{W}{LD}$
V = shaft surface velocity, sfm $= \frac{\pi DN}{12}$
W = total bearing load, pounds
L = bearing length, inches
D = inside diameter of bearing, inches
N = shaft speed, revolutions per minute
π = 3.1416



Note that the "D's" cancel out indicating that bearing design is dependent only on the total load, the revolutions per minute and the length of the bearing. This points out that for design conditions that dictate the load and speed, the length of the bearing governs the load-speed factor. The diameter need only be sufficient to obtain required shaft strength. Naturally, deviations from this basic principle are often necessary. However, bearings should not be shortened in design simply to bring the product of the load and speed within a particular PV factor; for, the lower the bearing pressure, the longer the service life.

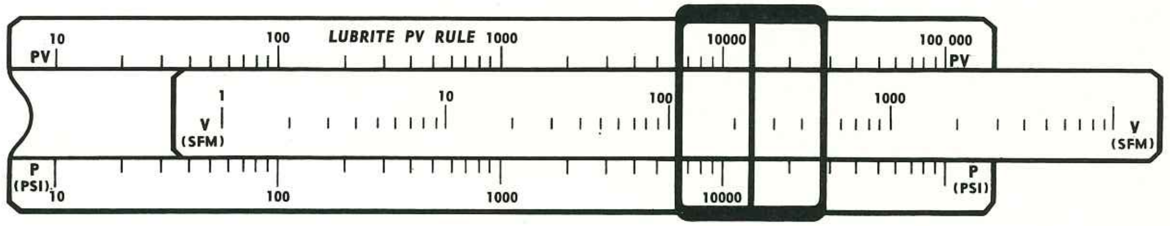
When calculating the unit loading there is no need to subtract the area of the Lubrite lubrication. The Lubrite lubricant has its own load carrying capacity by virtue of its being compressed into the recesses at pressures of 18-20,000 p.s.i., far above the actual design loading.

When two or more operating factors are extreme, the choice of a practical factor to be used in design work is a matter of engineering judgment and actual experience. The above representative groups are suggested. They do not represent ultimate limits, but are intended as a guide to bearing factors which will give long efficient service.

BEARING ALLOYS

The load carrying capacity of a bearing is dependent on the metallographic structure and chemical composition of the basic bearing material and type of lubrication. The selection of a proper bearing alloy is determined from the physical properties of the material, wear characteristics, and compatability of the bearing material and mating member in the operating media.

Lubrite bushings and washers may be manufactured from practically any bearing material to meet application requirements. However, continued tests, experiments and actual field reports have shown that of all the bearing metals used, the following alloys have proven the most successful with Lubrite lubrication and meet the requirements of most applications.



LUBRITE BRONZE (ALLOY 237)

This material is highly recommended for general duty applications where the loadings are in the order of 1000-2000 p.s.i. or less depending on speed and other conditions. This special alloy, developed in our laboratory and foundry, is the most economical, high-grade bearing metal for Lubrite applications and is recommended for its corrosion resistance, anti-friction properties, heat resistance, lubricity, impact resistance and wear life. Standard Lubrite bronze provides an ample factor of safety for long, dependable service.

HI-STRENGTH BEARING BRONZE (ALLOY 423)

Lubrite bearings manufactured from this alloy are recommended for general, continuous service at loadings of 2000 p.s.i. and speeds up to 100 sfm, and for heavy duty, intermittent service at loadings up to 7,000 p.s.i. and speeds up to 35 sfm. This alloy is specified in lieu of Alloy 424 for two piece bearings as it is economically adaptable to the special processes involved in manufacturing two piece bearings in the high strength bearing bronzes.

BRIDGE BEARING BRONZE (ALLOY 424)

This heavy duty material is recommended for heavy and severe loadings under slow moving and static conditions based upon PV as outlined on Page 13. For extremely heavy unit loadings, beyond the capacity of other bearings, one piece Lubrite Bridge Bearing Bronze Bushings with internal Lubriting* are recommended. Bearings of this type provide extremely high load-carrying capacity with a high factor of safety for applications where extra long service life is required.

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* See Fig. 2, page 8

PROPERTIES OF STANDARD ALLOYS

ALLOY NO.	ALLOY NAME	TENSILE STRENGTH (PSI)	YIELD POINT (PSI)	ELONGATION (% IN 2")	COMPRESSIVE STRENGTH .001 SET (PSI)	NOMINAL CHEMICAL COMPOSITION					APPLICABLE SPECIFICATIONS
		MINIMUM				Cu	Sn	Zn	Pb	OTHER	
237	LUBRITE BRONZE	40,000	18,000	20	17,000	86	9	1	2.5	1 Ni	ASTM B22, ALLOY D ASTM B143, ALLOY 1A QQ-L-225, COMP 16 S.A.E. 62 Modified*
423	HI-STRENGTH BEARING BRONZE	90,000	45,000	18	30,000	64	.20 MAX.	REMAINDER	.20 MAX.	3 Fe 5 Al 4 Mn	ASTM B147, ALLOY 8B QQ-B-726, CLASS B MIL-B-16522, CLASS 2 S.A.E. 430, GRADE A
424	BRIDGE BEARING BRONZE	110,000	60,000	12	55,000	64	.20 MAX.	REMAINDER	.20 MAX.	3 Fe 5 Al 4 Mn	ASTM B22, ALLOY E ASTM B147, ALLOY 8C QQ-B-726, CLASS C MIL-B-16522, CLASS 1 S.A.E. 430 GRADE B

* The chemical composition of the Specifications on Standard Lubrite Bronze is modified slightly to give the increased physical properties listed and to provide greater lubricity, impact resistance, ductility, and wear life.

OTHER BRONZE ALLOYS

Alloys ranging from those containing aluminum for hardness to those containing high quantities of lead for softness and lubricity are available. The following bronze alloys are regularly employed in the manufacture of Lubrite bearings where the application warrants their use.

ALLOY NO.	ALLOY NAME	APPLICABLE SPECIFICATIONS
195	Hi-Tin Bronze (84-16)	ASTM B22, Alloy B
225	Tin Bronze (88-8-4)	ASTM B143, Alloy 1B QQ-L-225, Comp. 5 MIL-M-16576 S.A.E. 620
305	High Leaded Tin Bronze (80-10-10)	ASTM B22, Alloy C ASTM B144, Alloy 3A S.A.E. 64
315	Leaded Tin Bronze (83-7-7-3)	ASTM B144, Alloy 3B QQ-L-225, Comp. 12 MIL-B-16261, Grade VI S.A.E. 660
326	Leaded Tin Bronze (85-5-9-1)	ASTM B144, Alloy 3C S.A.E. 66
417	Aluminum Bronze (85-4-11)	ASTM B148, Alloy 9C QQ-B-671, Class 3 MIL-B-16033, Class 3
418	Aluminum Bronze (81-4-4-11)	ASTM B148, Alloy 9D QQ-B-671, Class 4 MIL-B-16033, Class 4

Our modern non-ferrous foundry is completely equipped to produce quality castings conforming to any cast bronze specification.

SPECIAL ALLOYS

For unusual applications, Lubrite bearings have been manufactured from cast iron, corrosion resistant steels, titanium, Monel, Meehanite, NiVee bronze, ductile Ni-resist, Nodular Iron, tool steels, alloy steels and others.

CLEARANCES

Lubrite bearings are supplied completely finished with proper clearances and tolerances, ready for installation. Boring, reaming or other operations prior to or after assembly are not necessary and should be avoided as they may impair the operating efficiency and service life.

Diametral allowance or operating clearance is the amount (in thousandths of an inch) by which the inside diameter of a bearing exceeds the journal diameter. Diametral clearance is an essential consideration in any bearing design and the selection of the correct clearance is significant in the success of the bearing. Lubrite lubricants coat the interfaces with thick film lubrication. Therefore, for a running fit, greater clearance is required with Lubrite bearings than with thin film, oil or grease type bearings. This greater clearance does not indicate looseness. The Lubrite lubricant coats the journal and bearing wall and fills the clearance, thereby providing the assembly with a satisfactory operating fit.

Clearances must of necessity vary with the operating conditions. Factors such as speed, load, temperature, size, and type of application must be considered in the selection of a proper clearance. The following table will serve as a guide in the selection of correct clearances for the majority of applications. For special or unusual conditions, our Engineering Department will be pleased to make recommendations.

DIAMETRAL CLEARANCE TABLES

NOMINAL SHAFT DIAMETER	STANDARD RUNNING CLEARANCE* FOR GENERAL DUTY	COARSE RUNNING CLEARANCE* FOR HEAVY DUTY**
3/8″ — 1″	.004 — .005	.006 — .011
1 1/16″ — 2″	.005 — .007	.007 — .015
2 1/16″ — 3″	.007 — .009	.009 — .017
3 1/16″ — 4″	.009 — .011	.010 — .021
4 1/16″ — 5″	.011 — .013	.013 — .023
OVER 5″	.008 + (.001 x Shaft Dia.)	.010 + (.0015 x Shaft Dia.)

*"Close-in" due to normal press fit considered.

**Special applications require larger running clearances because of the nature of the operation. A Coarse Running Fit should be used for high temperature applications, for sheave bushings, hydro-electric gate rollers, heavy-duty, slow moving, trunnion bearing and other similar operating conditions.

For applications where the temperature exceeds 250°F, because of the varying coefficients of thermal expansion of different metals, special consideration must be given to choice of mating alloys, housing material, temperature differential, and speed and load in calculating clearances and interferences. Therefore, no pre-determined figures can be employed. Please consult our engineers for recommendations.

PRESS FIT AND INSTALLATION

Interference or press fit is the usual means of holding Lubrite bearings in place. A press fit is obtained by having the outside diameter of the bearing slightly larger than the housing bore. The amount of press fit should be just sufficient to prevent any movement between bearing and housing. Excessive interference requires extreme force to assemble and may deform the bearing. Where it is advantageous to allow for movement on both I.D. and O.D. of bushings, no press fit is necessary, but rather the bushing O.D. should be .002-.004 inch smaller than the housing bore. The recommended press fit for Lubrite bearings are listed below:

RECOMMENDED PRESS FIT

Bearings up to 4″ O.D.	.001-.003 inch
Bearings over 4″ O.D.	.002-.004 inch

Other possible methods of holding bearings in place are by means of dowels, set screws, keys, split pins, holding flanges as well as other mechanical means. Shrink fits are *not* recommended for use with Lubrite bearings due to possible damage to the bearing.

SURFACE FINISH

The proper functioning of a Lubrite bearing is dependent to a large extent on the quality of the surface finish. Lubrite, unlike most bearings, does not require a high degree of surface finish on the mating member. In general, an ordinary machined surface finish of 63 to 125 microinches is all that is necessary for best results with Lubrite. In fact, this range of finish offers better results than more expensive ground or polished surfaces because the Lubrite lubricant is embedded or keyed to the microscopic irregularities of the shaft forming a mirror-like, friction reducing film.

Where environmental corrosion of the journal material is a factor, surfaces in contact with Lubrite may be protected with chrome or other engineering platings, by cladding or spraying with non-corrosive materials or by using a corrosion resistant journal, without affecting the performance of Lubrite. Galvanized surfaces are not recommended.

CHAMFERS

With press-fitting bearings, chamfers are normally provided on the outside diameter of the bearing and on the housing bore to facilitate assembly and prevent possible damage to the bearing. Chamfers on the inside diameter of the bearing provide a lead for the insertion of the shaft. The longitudinal spacing of Lubrite lubricant recesses is dependent upon bearing length and chamfer size. Therefore, except in cases where journal or housing design requires a specific chamfer, Lubrite bearings are normally supplied with chamfers to provide the maximum lubricating effectiveness.

STANDARD PRACTICES

It is customary that the shaft size be made to the nominal fractional dimension, i.e., for a 1 1/2″ diameter shaft, the decimal dimension of the shaft is assumed to be: $1.500^{+.000}_{-.001}$. If a 1 1/2″ I.D. bushing is ordered, we normally provide the bushing with the proper inside diameter, i.e., $1.505^{+.001}_{-.000}$ to obtain the recommended diametral clearances for general duty.

For press fits, the housing bore is also assumed to be to the nominal fractional dimension, i.e., for a nominal 3″ O.D. bushing we assume the housing bore is to the nominal size, i.e., $3.000^{+.001}_{-.000}$. The bushing would be supplied with the O.D. $3.003^{+.000}_{-.001}$.

The above listed clearances and press fits are standard. If other requirements are necessary or the shaft or housing is not to the nominal fractional size, we have a wide range of completed tooling to take care of the majority of possibilities.

The aforegoing information is provided as a basic guide to assist the designer as to the best and most economical practices for Lubrite. Should the design or application require deviation from the above, our complete facilities make it possible to meet the most exacting requirements.

DESIGN

LUBRICANTS

LUBRITE lubricants are carefully compounded to provide distinct operating characteristics for particular types of service conditions. No single lubricant is a panacea for all bearing problems. Various Lubrite formulations have been developed to provide maximum lubricity, lowest coefficient of friction and greatest durability for specific service conditions.

LUBRITE products are completely self-lubricating and *do not* require supplementary lubrication as do many other so-called "oilless", "graphite" or self-lubricating items.

Research has shown that impurities in a lubricant quickly impair lubricity and operating efficiency. As little as one quarter of 1% of sharp, gritty matter in the form of impurities immediately devalues a lubricant. Therefore, Lubrite lubricants are made with first quality super-refined ingredients, free from gritty impurities and foreign substances that would detract from lubricating value.

Distinct Lubrite formulae are performing successfully under combinations of the following conditions:

Loadings:	from 0 p.s.i. to 15,000 p.s.i.
Temperatures:	sub-zero temperatures to 1500°F
Media:	underwater, in steam, acids, radioactivity, dust, oil, gases, chemicals, solvents, corrosive atmospheres, subject to high radiation and neutron bombardment
Service:	static, kinetic, oscillating, intermittent, continuous

The correct selection of the proper Lubrite lubricant for specific operating conditions is the key to Lubrite successes.

STANDARD LUBRITE LUBRICANT

will perform successfully in the great majority of applications and is normally furnished in all Lubrite products unless operating conditions warrant use of a more specialized Lubrite lubricant. Some typical applications where Standard Lubrite lubricant is used are:

- Temperatures up to 250°F
- In fresh or salt water*
- Exposure to unsuperheated steam
- Exposure to atmospheric elements
- Sub-zero temperatures
- PV up to 70,000
- General Duty service (where Lubrite replaces an ordinary oil, grease or anti-friction bearing)

Applications which do not fall within the above scope should be submitted to our engineers for the selection of the proper Lubrite lubricant for best results.

SPECIAL LUBRITE LUBRICANTS

In addition to the Standard Lubrite lubricant, various other Lubrite lubricants have been developed to meet not only the above conditions, but also other special requirements. A partial listing of these lubricants and special applications follows:

Type of Lubricant	Application (see Note below)
I	Temperatures from 250-550°F and superheated steam
II	Temperatures from 550-1000°F
III	Temperatures from 1000-1500°F
113 02H 4001	Where petroleum base products and/or temperatures up to 500°F are encountered
G	Underwater applications
F	Reciprocating movement - greatest resistance against scraping, shaving
K	Where solvents are present
AE	Subject to high intensity radiation
V	Special salt water applications
184 V-E H B BD P	Special lubricants for combinations of various conditions

NOTE: This listing of Special Lubrite lubricants is offered as information only. Where other than normal general duty bearing conditions are anticipated, kindly provide detailed data to our Engineering Department for their recommendations as to lubricant and bearing material.

**Advise if in salt water or highly mineralized or contaminated fresh water since consideration must be given to bearing material selection because of possibility of electrolysis and dezincification.*

COEFFICIENT OF FRICTION

Theoretical and usual laboratory methods for determining the coefficient of friction between materials and for the evaluation of lubricants are not readily applicable to common use and appear to have little practical value for the practicing user. Standard testing procedures, such as rubbing a ball on a rotating flat surface or rotating cylindrical surfaces against each other, fail to provide conclusive data since the contact area is only point or line bearing between test materials. These test methods are not directly applicable to bearings in an actual operational installation. The figures obtained are difficult to analyze and adapt to practical use unless the identical ideal laboratory conditions are duplicated. Even reproducibility of findings with this type equipment leaves much to be desired. Experience indicates that only full scale testing will produce reliable results.

In order to provide useable data to the engineer, Lubrite bearings are constantly tested under actual and simulated conditions, both in field tests and in the laboratory, on practical full size equipment. Field tests are regularly conducted, with the cooperation of customers, to correlate and confirm laboratory acquired data. The test equipment in our laboratory is designed to provide practically unlimited combinations of loads, speeds, temperatures and environments. Wearability, service life and coefficient of friction are accurately determined on this test equipment by means of recording instruments, measuring devices and proper controls. The friction coefficient, thus determined, represents the true journal friction of a Lubrite bushing and the true static and kinetic friction of Lubrite liners and expansion plates.

It is well known that the coefficient of friction of any system or combination is directly affected by the various factors of operation. These factors, such as velocity, temperature gradient, loading, shock or impact, surface finishes, running clearances, conduction of frictional heat and environmental conditions have a decided influence on the value of the friction coefficient. Therefore, no single coefficient of friction value can be established to cover all conditions or applications. An average"value of the coefficient of friction is meaningless, since this median figure does not indicate the high value that the design must allow for. Likewise, "one-time" low coefficients that may not be duplicated are of no value. Our suggested values of friction coefficient for Lubrite bearings are reliable, safe values to use in design for most applications. However, it must be borne in mind that the friction coefficient will vary with the particular operating conditions.

Space is too limited to permit a complete treatise on the subject of the coefficient of friction of the many types of Lubrite bearings under all possible conditions. Also, it would be inconclusive to submit one or two typical test results. Therefore, we have found from experience that it is best to summarize our findings in the following manner:

DESIGN FRICTION

Lubrite bushings, used in medium and heavy load applications, will have a friction coefficient of 0.035 to 0.085. For lighter loads, the coefficient will be in the order of 0.09. **For general applications, a design coefficient of 0.10 is recommended as a practical figure with an ample margin for safety. For high temperature use or where very light loads are anticipated, a value of 0.15 is suggested.**

Should you desire specific data regarding the coefficient of friction of Lubrite under particular combinations of service conditions, we will be pleased to check our records for similar applications and offer you our advice and recommendations. For new applications, we will investigate the factors involved and test, if necessary and practical, to offer the proper bearing material and lubricant for the successful solution to your problem.

CASE HISTORIES

The numerous varied and diversified applications of Lubrite in the solution of bearing problems throughout the world makes it impractical spacewise to mention, but briefly, a few of the instances where Lubrite has offered a successful solution.

One large manufacturer of rubber goods trebled the life of the thousands of bushings in his conveyor systems over the normal grease type bearings originally used. These bushings are run on an around-the-clock basis, alternately subjected to superheated steam and a cold water rinse in the process.

A textile machinery manufacturer designed and built an entire machine equipped with Lubrite self-lubricating bearings. These machines offer maintenance-free service and also eliminate the cost of such maintenance and the lubrication normally required, thus giving the equipment a decided sales advantage over older, less modern designs.

During preliminary trials of a supersonic wind tunnel several hundred bushings in the control mechanisms froze and seriously scored the shafts. Lubrite bushings replaced these other bearings and proved to be the answer. These bushings must operate at loadings up to 6000 p.s.i. and temperatures in the order of 600°F. Today, nearly all wind tunnel designs specify Lubrite.

Atomic energy was a new and mysterious field for the bearing designer. Ordinary bushings, requiring oil or grease lubrication, proved unsatisfactory because of the breakdown of organic material due to gamma radiation. Lubrite engineers in cooperation with the engineers on atomic projects have developed a bearing and Lubrite lubricant for successful performance in this field. Nearly every atomic plant built today has Lubrite in it.

The missile field brought other new problems to the bearing designer. Lubrite again was called upon for a solution. Lubrite, today, is being used in the missile program from the storage vaults, to the carrier vehicles, to the launchers.

In the hydro-electric field, Lubrite has long been the leader in the supply of superior gate bearings. Whether for the fixed wheels of intake gates, for the main pivot bearings on drum gates, or for the trunnions of tainter gates, Lubrite bearings are universally specified. From stop-dogs to control gates, from flow control valves to flap gates, from penstock expansion bearings to gate crane sheaves, all are well within the scope of success with Lubrite.

A field test conducted by the Chief Engineer of a major design engineering firm on Lubrite bushings in the wheels of intake gates found that the coefficient of friction was substantially below our recommended design coefficient.

A major dam gate fabricator, under the supervision of consulting engineers of the Saint Lawrence Seaway, ran full scale tests on 8½" diameter Lubrite bearings for fixed wheel gates under the most extreme conditions anticipated. They found Lubrite met all the requirements successfully, with a coefficient of friction that did not exceed 0.08. In order to evaluate and compare the performance of Lubrite, this manufacturer conducted duplicate tests on similar appearing bearings. At one half the load, these other bearings required over twice the power, or evaluated in terms of friction, the coefficient of friction was four times as great as Lubrite's. In order to insure the safety of his test equipment, this manufacturer terminated the tests on the similar appearing bearings, and has specified that Lubrite bearings *only* are to be used in his equipment. What conclusive proof of the superiority of Lubrite!

From agricultural equipment to flour mills and bakeries — from mines to steel mills and chemical plants — from logging to pulp and paper mills — from oil drilling rigs to refineries — from earth-moving equipment to paving machinery and bridges on our highways — from the development of hydro-electric, steam-generated and atomic power to the machines of industry and equipment for the home — from the simplest device of peace time to the most complex equipment and developments of the missile, atomic and space age — in fact, almost anywhere a wheel or shaft turns or a surface slides — lies a potential application for Lubrite.

SPECIFICATIONS

Specifications are intended to fully describe a product and establish a level of guaranteed and acceptable quality. An incomplete specification or one lacking in complete and essential details may allow the use of inferior products which could downgrade the performance of the equipment. Therefore, it is in the best interest of the engineer and designer to employ specifications that will designate a product suitable to the requirements of the application.

To assist in the writing of complete detailed specifications, the following typical examples are suggested:

> "Lubrite Self-Lubricating Bushings shall be suitable for the following operating conditions . . . (describe speed, load and other factors governing the service involved) . . ."
>
> "Self-Lubricating Bushings shall be Lubrite or approved equal and be an article of standard production by an established manufacturer of such equipment. The bearings shall be completely self-lubricating and require *no* additional or supplementary lubrication for the entire service life. They shall be provided with special recesses in a uniform, geometric and overlapping pattern to give optimum lubricating coverage in the direction of motion. The recesses shall be filled with a lubricating compound capable of withstanding the atmospheric elements and temperatures for service both dry and submerged. The lubricating compound shall consist of metals, metallic oxides, graphite and a lubricating binder. All ingredients must have inherent and native lubricating qualities. The compound shall be compressed into the recesses by hydraulic pressure so as to form dense, non-plastic lubricating inserts. The lubricating area shall comprise not less than 30% of the total area. The bearing metal shall be . . . (see page 14-15 for proper bearing material selection). The bushings shall not be reamed after the lubricating compound has been pressed into place. The coefficient of friction shall not exceed 0.10."

AVAILABILITY AND PRICES

No single bearing material or lubricant can solve all bearing problems. Each bearing application has its own peculiar physical and functional requirements. In order to insure the correct combination of material and lubricant, all Lubrite bearings are engineered and custom-made for the particular design usage intended, rather than offering a limited selection of a standard type stock bearing which would necessarily have to serve as a "cure-all".

The multiplicity of styles, sizes and types of application for which Lubrite bearings are designed, makes it impracticable to publish a price list. Our standardized methods and complete manufacturing facilities permit close control over production, scheduling and cost. These complete facilities enable us to produce "custom-made" Lubrite products with "production-line" efficiency, speed and economy.

INQUIRY AND ORDERING DATA

An analysis of your bearing application or problem will enable our engineers to recommend the most economical and practical bearing for your service requirements. Furnishing of complete information often results in substantial cost savings. Desired information furnished should include the following:

- TYPE of machine or application — enclose drawing of bearing arrangement, if available
- QUANTITY involved and possible yearly requirements
- SIZE — including chamfers, special machining and/or holes and finishes necessary
- STYLE — one piece or two piece bushing, washer, liner, expansion plate, etc. (if flanged bushing is flange for thrust motion or for holding)
- SIZE, material (including hardness) and tolerance of shaft or mating surface (housing material size and tolerance for high temperature bushing applications)
- TOTAL LOAD or unit loading (in pounds per square inch of projected area)
- SPEED in RPM (revolutions per minute) or SFM (surface feet per minute)
- TYPE OF MOTION — rotary, oscillating (max / min degrees), sliding (amount)
- LOAD CLASSIFICATION — intermittent, shock, constant (range)
- AMBIENT BEARING TEMPERATURE
- OPERATING MEDIA such as moisture, chemical vapor, dust, corrosive, atmospheric, radioactivity, etc.
- PREVIOUS BEARINGS used and results

Lubrite®

Self-lubricating Bushings, Bearings, Washers and Expansion Plates

New York and Pacific Coast Sales Offices

Rec. 1-11-66

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